REMARKS

Claims 1-16 stand rejected under 35 U.S.C. § 112, second paragraph. The Examiner sets forth several questions regarding the specifics of the structure as a basis for the rejection. In sum, the Examiner alleges that the claims "should represent the embodiment of the invention as disclosed in Fig. 1." For example, the Examiner asks "what structure makes up the resonant cavity?" However, it is respectfully submitted that the Examiner's objections are premised on § 102/103 rather than on § 112. Nothing in § 112 of the patent law requires that Applicants limit the claimed invention to any one particular construction of the resonant cavity. That is, the present invention as recited in the claims embodies all constructions of a resonant cavity which satisfy the terms recited in the claims.

It is not necessary for Applicants to claim the details of each of the components (e.g., resonant cavity, etc.) making up the "semiconductor laser device." Drawing Figures in patent applications merely represent *exemplary* embodiments of the invention, and are not intended to limit the scope of the claims. Applicants respectfully submit that the Examiner's questions are directed to claim ***scope*** rather than claim ***definiteness***, which should be analyzed under § 102/103 rather than § 112. The Examiner is directed to MPEP § 2173.04 under the heading entitled "Breadth is Not Indefiniteness" which sets forth the applicable standard.

It is respectfully submitted that no additional features to those already recited in the pending claims are necessary to define *generally* a "semiconductor laser device." For example, one possible embodiment(s) of the *broadly* recited "semiconductor laser device" includes a resonant cavity disposed between respective semiconductor layers such that the laser device can emit light when applying voltage to the semiconductor layers. A *specific* construction of the

semiconductor laser device, or components thereof, need not be defined for purposes of satisfying § 112, second paragraph, as set forth in MPEP § 2173.04.

The Examiner's objection to the phrase "at the main surface and the opposite surface" has been rendered moot by the deletion of said phrase. Further, claim 1 has been amended to clarify the language regarding niobium oxide.

Based on all the foregoing, it is submitted that claims 1-16 are definite. Accordingly, it is respectfully requested that the rejection of claims 1-16 under 35 U.S.C. § 112, second paragraph be withdrawn.

Claims 1-15 stand rejected under 35 U.S.C. § 103 as being unpatentable over newly cited Sagawa et al. in view of Caprara et al., and claim 16 stands rejected under 35 U.S.C. § 103 as being unpatentable over Sagawa et al. in view of Caprara et al. and Yamanaka. Claims 1 and 12 are independent. These rejections are respectfully traversed for the following reasons.

One of the objects of the present invention is to enable suppression of the degradation of characteristics of a semiconductor laser device having an oscillation wavelength of 0.4 μm or less, which is shorter than that of conventional semiconductor laser devices, due to heat generation of the end facet reflective film. According to an aspect of the present invention, because an absorption coefficient of niobium oxide is smaller than that of titanium oxide when the oscillation wavelength is 0.4 μm or less, there is an advantage over the prior art of using niobium oxide for the end facet reflective film in ***combination*** with an oscillation wavelength of 0.4 μm or less. Only Applicants have considered such problems with the conventional laser and provide the means to solve said problems in relation to the aforementioned ***combination***.

Turning to the cited prior art, Sagawa et al. (USP 5,844,931; "Sagawa") discloses a semiconductor laser device having an end facet reflective film, but not the use of niobium oxide for the end facet reflective film. Caprara et al. (USP 6,285,702; "Caprara") teaches a reflective film with niobium oxide. However, the niobium oxide is suggested only as a material that is effective for an oscillation wavelength up to 0.7 μm, ***and hence on the same basis as titanium oxide***. Thus, Caprara fails to teach the advantage of niobium oxide over titanium oxide when the oscillation wavelength is 0.4 μm or less, which is discussed in the present invention.

Moreover, since the semiconductor laser device of Caprara is a surface-emitting type, a reflective film made of niobium oxide is formed on a substrate surface (denoted as reference number 30), ***but not on an end facet***. Indeed, Caprara discloses that the reflective prevention film formed on end-faces 120 (*see* col. 24, line 63) is aluminum oxide (Al_2O_3) or yttrium oxide (Y_2O_3) (see col. 24, lines 60-61) rather than niobium oxide. Hence, Caprara fails to suggest the structure of the present invention, and there is no motivation to modify the ***end facet*** of Sagawa with the niobium oxide formed ***on a substrate surface*** taught by Caprara.

In general, in an end face emission type laser device such as the present invention, a reflective film can be formed on an end facet so as to be in direct contact with a resonator, i.e., a quantum well active layer. Thus, with a reflective film made of a material having a large absorption coefficient, heat generated by light, which is absorbed into the reflective film, is directly conducted to the resonator (active layer), so that an operation characteristic of the laser device degrades.

On the other hand, in a surface-emitting type laser device of Caprara, the reflective film is not formed on an end facet but on a surface of the semiconductor layer, and the reflective film is not directly in contact with the resonator. Even if light is being absorbed into the reflective

film, heat generated thereby will not be well conducted to the inside of the laser device, and the device will not degrade. Moreover, Caprara merely discloses the reflective film on a surface 30 of a mirror 32, but not on any active layer.

Compared with the surface-emitting laser device of Caprara, the present invention focuses on solving the problem of the end-facet reflective laser device, which is more sensitive to the heat generation in the reflective film, particularly an advantage of niobium oxide over titanium oxide in a region where an oscillation wavelength is 0.4 μm or less.

The Examiner alleges that a semiconductor laser device having a reflective film made of niobium oxide on an end facet disclosed in the present invention is obvious in view of Sagawa and Caprara. Caprara, however, teaches using niobium oxide on the same basis as titanium oxide ***on a substrate surface***, while the present invention selects niobium oxide rather than titanium oxide as a superior material in the ***end-facet*** reflective laser device ***having an oscillation wavelength of 0.4 μm or less***.

Caprara's niobium oxide is formed on a layer distinct from the facet in Sagawa, and further, the present invention provide new and/or unexpected results over the prior art. Accordingly, in view of the foregoing, it is respectfully submitted that there is no motivation for combining Sagawa and Caprara in the manner set forth by the Examiner.

Furthermore, Sagawa discloses an infrared laser device having an oscillation wavelength within a range of 0.9 μm to 1.1 μm, while Caprara discloses an OPS-laser device having an oscillation wavelength of 0.7 μm or less, further evidencing the distinction between the two disclosures and lack of motivation to combine teachings thereof, due to the lack of any overlapped region of the oscillation wavelength in each laser device-type. In particular, Caprara discloses using niobium oxide specifically for emission having a wavelength less than 0.7 μm

(*see* col. 23, line 65 – col. 24, line 10). However, the device of Sagawa is directed to laser emissions of 0.9-1.1 μm (*see* col. 2, lines 3-5). Accordingly, because Sagawa operates outside the range that Caprara suggests using niobium oxide, it is respectfully submitted that the motivation relied on by the Examiner to make the combination is not attributable to the device of Sagawa.

At best, Caprara provides motivation for using niobium oxide with OCR lasers on substrate surfaces, and is silent as to any purported motivation for use with an end-fact in the laser-type disclosed by Sagawa. Only Applicants' specification provides motivation for using niobium oxide specifically with internal cavity lasers in the manner set forth in the pending claims. For example, the present invention enables suppression of the temperature increase in the vicinity of the end facet of the resonant cavity so that output power can be increased, while the prior art is silent as to such problems let alone possible solutions.

In sum, only Applicants' specification provides the motivation for the ***combination*** of an internal laser (end facets) and niobium oxide, whereas Caprara et al. discloses niobium oxide only for OCR lasers on ***substrate surfaces*** thereof so as to provide no motivation for applying the niobium oxide to the facet of Sagawa. Indeed, as mentioned above, Cabrara expressly discloses aluminum or yttrium oxide for facet films so as to implicitly teach away from using niobium oxide for facets. The prior art is silent as to the heating problem of internal lasers and the ability of niobium oxide to solve such problems by forming a niobium oxide film on an ***end facet*** of the laser.

Based on all the foregoing, it is submitted that claims 1-16 are patentable over the cited prior art. Accordingly, it is respectfully requested that the rejections of claims 1-16 under 35 U.S.C. § 103 be withdrawn.

CONCLUSION

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT, WILL & EMERY

Ramyar M. Farid
Registration No. 46,692

600 13th Street, N.W.
Washington, DC 20005-3096
(202) 756-8000 RMF:MWE
Facsimile: (202) 756-8087
Date: December 2, 2003

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